



Nanotechnology in India

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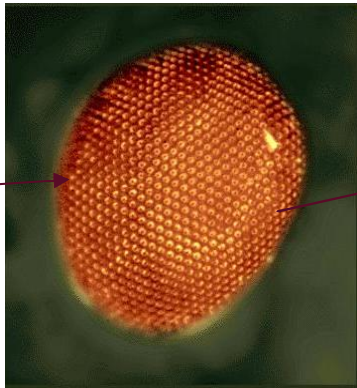
Utah State University

Logan, UT 84322

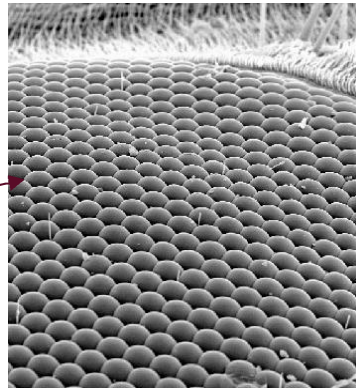
Understanding Size: Step-by-step magnification



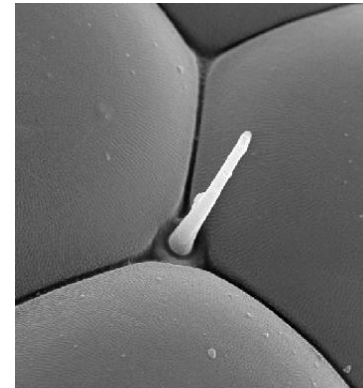
1 cm



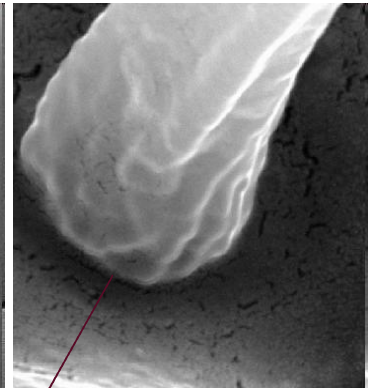
100 μm s



10 μm

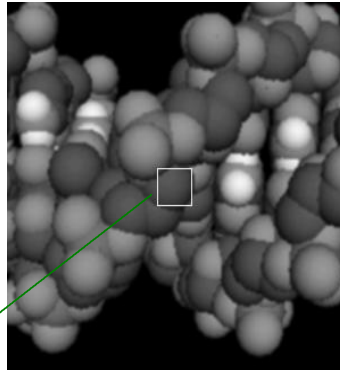


1 μm



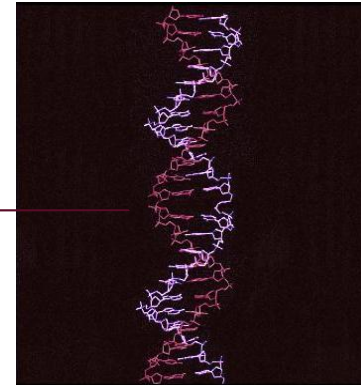
100 nm

Molecule



1 nm

Atom



10 nm

What is Nanotechnology?

G	M	k	d	c	m	μ	n	p	f
Giga	Mega	kilo	deci	centi	mili	micro	nano	pico	femto
10^9	10^6	10^3	10^{-1}	10^{-2}	10^{-3}	10^{-6}	10^{-9}	10^{-12}	10^{-15}

Nano means "Dwarf" in Greek

How small is one nanometer (nm)?

1 nanometer (nm)

= 1/ 1000,000,000 meter;



**MICRO-
technology**

PRESENT



**NANO-
technology**

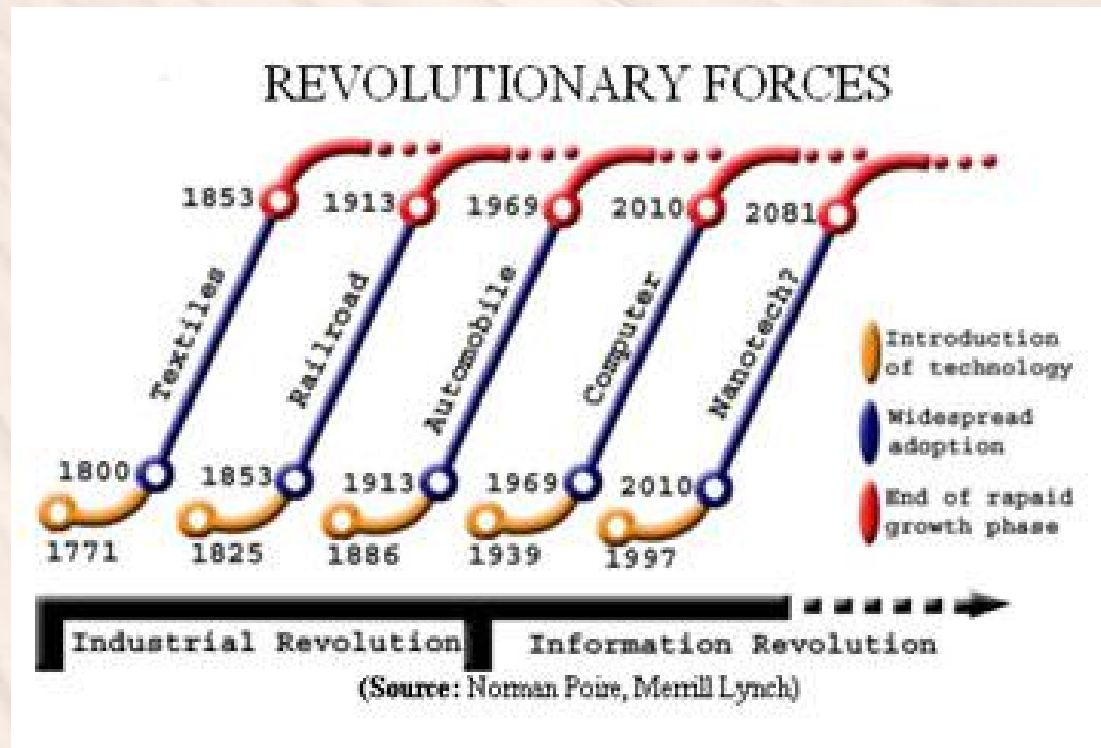
FUTURE



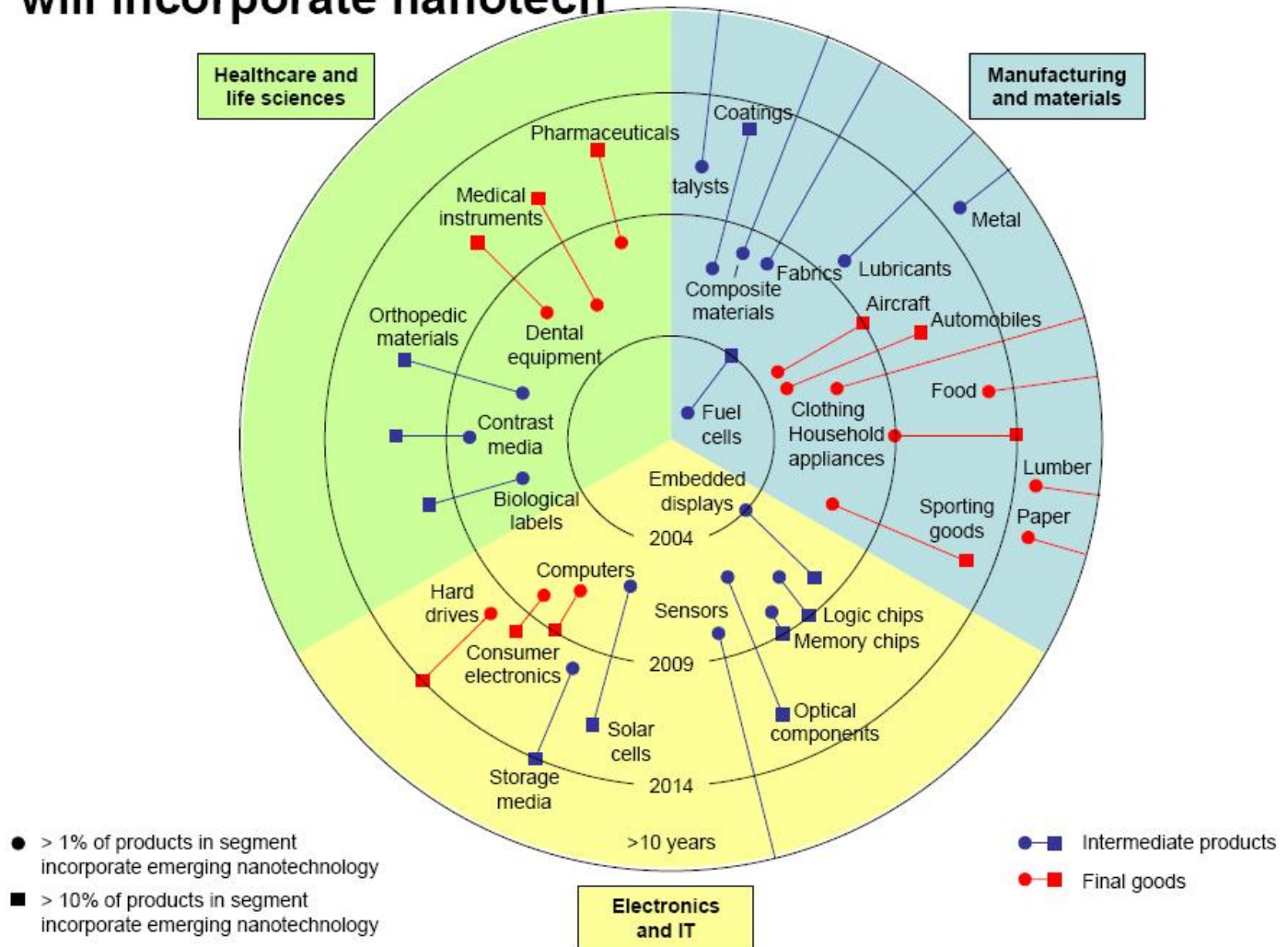
If you could **split** hair into 50/60 separate strands, each would be a **micrometer** wide.

If you could **split** that hair into 50,000/60,000 separate strands, each would be a **nanometer** wide.

-:Future of Nanotech:-



In 2014, 15% of manufacturing output – \$2.6 trillion – will incorporate nanotech



Source: October 2004 Lux Research Report "Sizing Nanotechnology's Value Chain"

Nanotechnology (enabled) Products (2007)

(Lux research report; www.luxresearchinc.com)

\$147 billion worth of nano-enabled products produced in 2007

Materials and manufacturing sector– \$97 billion
(coatings and composites for products like automobiles and buildings)

Electronics - \$35 billion
(emerging nanotech applications in fields like displays and batteries)

Healthcare - \$15 billion
(driven by pharmaceutical applications)

Regional Economic Impact:

US - \$ 59 billion

Europe - \$47 billion

Asia/Pacific - \$31 billion

Rest - \$9.4 billion

**NANOTECH TO IMPACT \$3.1
TRILLION IN
MANUFACTURED GOODS IN
2015**

Nano-Products



	<p>PhotoActiv™ – breaking down organic dirt The unique Activ™ coating reacts with UV rays in sunlight to generate a photocatalytic process that loosens and breaks down organic dirt particles on the surface of the glass.</p>
	<p>Hydrophilic – washing away dirt The surface of the coating is hydrophilic. It attracts water so that it spreads and forms a thin film that 'shoots' away quickly and dries without spotting.</p>

800+ manufacturer-identified nanotechnology-based consumer products currently on the market.

[Australia](#)

[Canada](#)

[China](#)

[Denmark](#)

[Finland](#)

[France](#)

[Germany](#)

[Israel](#)

[Italy](#)

[Japan](#)

[Korea](#)

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[New Zealand](#)

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[Thailand](#)

[UK](#)

[USA](#)

<http://www.nanotechproject.org/inventories/consumer/browse/>

Nano in India





India's Nano Initiative and current Status

India's nanoscience and technology funding and policies are in their infancy.

Since the launch of a US\$250 million five-year national nanotech mission in 2007, India has seen a rise in the number of scientists working in the field of nanotechnology

India has more than 30 industries and 50 institutes engaged in nanotech research and development, with most efforts focusing on chip design, nanomedicine and nanomaterials.

If synergies between nanotechnology and biotechnology, can be identified and exploited, India stands to emerge as a leading niche player in the nanoworld.

Government (Fed & States) spending on nanotechnology on the rise to promote infrastructure development

Lack of industry links "keeping Indian nanotech small"





Plenty of Rooms to Grow

The Confederation of Indian Industry (CII) has recommended the establishment of a government fund to promote the commercialization of nanotechnology.

'Ketac N100 Nanoionomer' a nano based dental material released by 3M in India.

Moser Baer Photovoltaic Ltd (MBPVL) will invest Rs 200 billion (\$5 million) in a PV and nanotechnology factory in Tamil Nadu.

DuPont India Announces the Opening of the FIRST research facility.

Nano funding — BC-India expressions of interest.

Biocon, Abraxis Consortium Launches nanotechnology based 'Anti-Cancer Drug'

US firm to set up first nanotech park in Himachal.





Right time to step-in:

- Favorable political situation
- Growing economy
- Indian are technology savvy
- Open to evaluating newer technologies
- Healthcare is a dynamic market
- Technical skills available

Suggestion:

Utah Nano-bio Center (New Delhi/Pune/Bangalore)

Information:

<http://www.yashnanotech.com/>

<http://www.bharatbook.com/detail.asp?id=70531>

<http://www.indiananotechnology.com/>



Nano at Utah:



The logo for nanoUtah 2009 features the word "nano" in red and "Utah 2009" in grey. The background is a light grey molecular structure with red spheres representing atoms.

5th ANNUAL UTAH STATEWIDE NANOTECHNOLOGY CONFERENCE

Devices & Sensors · Energy · Medicine · Materials & Characterization

SALT LAKE CITY · MARRIOTT CITY CENTER · OCT 15-16

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